

CLAIMS

What is claimed is:

- 5 1. A method for making mono-axially oriented draw tape, the method comprising the steps of:
- forming a solid sheet of thermoplastic material from molten thermoplastic material;
- producing a set of draw tape feeds from the solid sheet of thermoplastic material; and
- 10 stretching and annealing the set of draw tape feeds to orient molecules within the set of draw tape feeds such that tensile strength of each draw tape feed is greater in a first direction than in a second direction which is substantially perpendicular to the first direction.
- 15 2. The method of claim 1 wherein the step of stretching and annealing includes the step of:
- passing the set of draw tape feeds around a series of rotating temperature-controlled rollers to stretch and anneal the set of draw tape feeds, wherein the series of rotating temperature-controlled rollers includes a first roller which is configured to rotate at a first rate and have a first temperature, and a second roller which is configured to rotate at a second rate that is different than the first rate and have a second temperature that is different than the first temperature.
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3. The method of claim 1 wherein the step of producing the set of draw tape feeds includes the step of:
- cutting the solid sheet of thermoplastic material along the first direction to produce, as the set of draw tape feeds, separate feeds of draw tape.

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4. The method of claim 3, further comprising the step of:
- after the step of stretching and annealing, simultaneously winding the separate feeds of draw tape onto respective hubs in order to simultaneously form multiple rolls of draw tape.

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5. The method of claim 1 wherein the molten thermoplastic material includes molten linear low-density polyethylene, and wherein the step of forming the hardened sheet of thermoplastic material includes the step of:

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cooling the molten linear low-density polyethylene in a bath in order to form, as the solid sheet of thermoplastic material, a single solid layer of linear low-density polyethylene.

6. The method of claim 5 wherein the step of forming the solid sheet of thermoplastic material further includes the step of:

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prior to the step of cooling, extruding the molten linear low-density polyethylene through a die that defines an elongated opening.

7. Mono-axially oriented draw tape made by a method comprising the steps of:
forming a solid sheet of thermoplastic material from molten thermoplastic material;
producing a set of draw tape feeds from the solid sheet of thermoplastic material; and
stretching and annealing the set of draw tape feeds to orient molecules within the set of draw tape feeds such that tensile strength of each draw tape feed is greater in a first direction than in a second direction which is substantially perpendicular to the first direction.
8. The mono-axially oriented draw tape of claim 7 wherein the step of stretching and annealing includes the step of:
passing the set of draw tape feeds around a series of rotating temperature-controlled rollers to stretch and anneal the set of draw tape feeds, wherein the series of rotating temperature-controlled rollers includes a first roller which is configured to rotate at a first rate and have a first temperature, and a second roller which is configured to rotate at a second rate that is different than the first rate and have a second temperature that is different than the first temperature.
9. The mono-axially oriented draw tape of claim 7 wherein the step of producing the set of draw tape feeds includes the step of:
cutting the solid sheet of thermoplastic material along the first direction to produce, as the set of draw tape feeds, separate feeds of draw tape.

10. The mono-axially oriented draw tape of claim 8 wherein the method further comprises the step of:
- 5 after the step of stretching and annealing, simultaneously winding the separate feeds of draw tape onto respective hubs in order to simultaneously form multiple rolls of draw tape.
11. The mono-axially oriented draw tape of claim 7 wherein the molten thermoplastic material includes molten linear low-density polyethylene, and wherein the step of forming the solid sheet of thermoplastic material includes the step of:
- 10 cooling the molten linear low-density polyethylene in a bath in order to form, as the solid sheet of thermoplastic material, a single solid layer of linear low-density polyethylene.
12. The mono-axially oriented draw tape of claim 11 wherein the step of forming the solid sheet of thermoplastic material further includes the step of:
- 15 prior to the step of cooling, extruding the molten linear low-density polyethylene through a die that defines an elongated opening.

13. A system for making mono-axially oriented draw tape, comprising:
a front-end assembly that is configured to form a solid sheet of thermoplastic material from molten thermoplastic material;
an intermediate assembly, coupled to the front-end assembly, that is
5 configured to produce a set of draw tape feeds from the solid sheet of thermoplastic material; and
an orientating assembly, coupled to the intermediate assembly, that is configured to stretch and anneal the set of draw tape feeds to orient molecules within the set of draw tape feeds such that tensile strength of each draw tape feed
10 is greater in a first direction than in a second direction which is substantially perpendicular to the first direction.
14. The system of claim 13 wherein the orientating assembly includes a series of rotating temperature-controlled rollers which are configured to stretch and anneal
15 the set of draw tape feeds, wherein the series of rotating temperature-controlled rollers includes a first roller which is configured to rotate at a first rate and have a first temperature, and a second roller which is configured to rotate at a second rate that is different than the first rate and have a second temperature that is different than the first temperature.
- 20 15. The system of claim 13 wherein intermediate assembly includes:
a cutting assembly that is configured to cut the solid sheet of thermoplastic material along the first direction to produce, as the set of draw tape feeds, separate feeds of draw tape.

16. The system of claim 14, further comprising:

a winding assembly, coupled to the orientating assembly, that is configured to simultaneously wind the separate feeds of draw tape onto respective hubs in order to simultaneously form multiple rolls of draw tape.

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17. The system of claim 13 wherein the molten thermoplastic material includes: molten linear low-density polyethylene, and wherein the front-end assembly includes:

a bath assembly that is configured to cool the molten linear low-density polyethylene in order to form, as the solid sheet of thermoplastic material, a single solid layer of linear low-density polyethylene.

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18. The system of claim 16 wherein the front-end assembly further includes:

a extruder coupled to the bath assembly, wherein the extruder includes a die that defines an elongated opening, and wherein the extruder is configured to extrude the molten linear low-density polyethylene through the die.

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19. A method for making a draw tape bag, the method comprising the steps of:

configuring a set of thermoplastic panels to define (i) a bag cavity and (ii) a set of hem channels;

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positioning a set of mono-axially oriented draw tape strips relative to the set of hem channels such that each mono-axially oriented draw tape strip is disposed within a respective hem channel; and

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fastening each mono-axially oriented draw tape strip to the set of thermoplastic panels.

20. The method of claim 19 wherein each draw tape strip is a section of single-layer mono-axially oriented linear low-density polyethylene having a pair of ends, and wherein the step of fastening includes the step of:
- heat sealing the pair of ends of each strip of single-layer mono-axially oriented linear low-density polyethylene to the set of thermoplastic panels.
21. A draw tape bag, comprising:
- a set of thermoplastic panels which is configured to define (i) a bag cavity and (ii) a set of hem channels; and
- a set of mono-axially oriented draw tape strips, wherein each mono-axially oriented draw tape strip is disposed within a respective hem channel, and wherein each mono-axially oriented draw tape strip fastens to the set of thermoplastic panels.
22. The draw tape bag of claim 21 wherein each draw tape strip is a section of single-layer mono-axially oriented linear low-density polyethylene having a pair of ends which is heat sealed to the set of thermoplastic panels.
23. A system for making a draw tape bag, comprising:
- a folding and positioning assembly that (i) configures a set of thermoplastic panels to define a bag cavity and a set of hem channels, and (ii) positions a set of mono-axially oriented draw tape strips relative to the set of hem channels such that each mono-axially oriented draw tape strip is disposed within a respective hem channel; and
- a fastening assembly, coupled to the folding and positioning assembly, that fastens each mono-axially oriented draw tape strip to the set of thermoplastic panels.

24. The system of claim 23 wherein each draw tape strip is a section of single-layer mono-axially oriented linear low-density polyethylene having a pair of ends, and wherein the fastening assembly is configured to heat seal the pair of ends of each section of single-layer mono-axially oriented linear low-density polyethylene to the set of thermoplastic panels.

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Patent for the Invention